

Remarks

A marked up copy of the substitute specification including amendments is attached.

Red ink corrections to Figure 1 are presented for the Examiner's approval. These amendments are to add call out numbers which appear in the substitute specification. Upon approval by the Examiner, a replacement formal drawing will be submitted.

The Examiner has raised claim objections to claims 1-4 because in claim 1 "the side" at line 4 lacks proper antecedent basis, in claim 2 "the rear most portion" at line 3 lacks antecedent basis, and in claim 4 "the end" at line 2 lacks proper antecedent basis.

Accordingly, claims 1-4 have been amended to address these issues. In claim 1, in order to clarify the claim, a circumferential surface is recited instead of the side thus clarifying the location of the terminals. In claim 2, the rear most portion language has been amended to recite the back cover of the socket and this claim has also been amended to depend from claim 4 wherein the back cover is introduced. The Examiner is invited to renumber claim 2 based upon the changed dependency prior to printing of any patent which issues from these claims. Claim 1 has also been amended to recite that the neck has an end therefore providing antecedent basis for "the end" in claim 4.

Claims 1-4 are rejected under 35 U.S.C. Section 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner asserts that in claim 1 "the terminals" and "the corresponding terminals" lacks proper antecedent basis and it is not clear if they are the same terminals. Accordingly, claim 1 has been amended to recite that the socket has electrical contacts while the electron gun includes terminals. The specification has been also amended accordingly to clarify the distinctiveness of each of these components. These changes are believed to address the Examiner's rejection of these claims under Section 112 and to clarify both the specification and the claims.

Claims 1 and 4 are rejected under 35 U.S.C. Section 102(b) as being anticipated by Cho (5,963,275). The Examiner contends that Cho teaches a socket which is mounted on a circuit board to a CRT having a funnel and a neck which contain an electron gun, terminals being positioned along the side of the neck portion of the CRT, the circuit board being positioned with a first side facing the funnel portion and a second side facing away from the funnel portion, the socket having terminals which engage corresponding terminals on the CRT, the socket terminals being positioned on the second side of the circuit board. The applicant respectively disagrees with the Examiner in that Cho does not teach nor suggest terminals for the electron gun being positioned along a side of the neck as required by claim 1. In order to better clarify this distinction, applicants have inserted language referring to a circumferential surface of the neck around which the terminals are positioned. Applicants assert that neither Cho nor the other references of record teach nor suggest terminals positioned along a circumferential surface of the neck for connection to electrical contacts in a socket which is mounted on a circuit board. The rejection of claims 1 and 4 under 35 U.S.C. Section 102 is therefore respectfully overcome.

Claims 1-4 are rejected under 35 U.S.C. Section 103(a) as being unpatentable over Johnson (3,944,892) in view of Nicholson et al (4,590,540). The Examiner asserts that Johnson shows an arrangement for coupling a cathode ray tube to a socket which is mounted on a circuit board wherein the CRT has a funnel portion and a neck portion containing an electron gun, the circuit board being positioned with a first side facing the funnel portion and a second side facing away from the funnel portion, the socket having terminals which engage corresponding terminals on the CRT, the socket terminals being positioned on the second side of the circuit board. The Examiner admits that Johnson does not show terminals being positioned along the side of the neck and then relies upon Nicholson et al for a teaching of terminals being positioned along a side of the neck. Applicants agree that Johnson does not

teach nor suggest the location of the terminals as required by claim 1 and further assert that Nicholson et al does not teach nor suggest the terminals being positioned along a side surface of the neck. Nicholson et al, in contradistinction, teaches a base 11 formed of plastic or similar material which incorporates a plurality of ribs 12 which physically separate electrical terminals 13 of the cathode ray tube 9. The terminals 13 as best shown in Figure 1b of Nicholson et al are a part of the plastic base 11 and do not extend over a side surface of the glass neck 10. The plastic base 11 adds to the overall length dimension of the neck 10 whereby the invention as recited in claim 1 eliminates the need for such added length by eliminating the need for a plastic base or connector to engage the socket on the circuit board. Claim 1, as described above, has been amended to better clarify that the terminals are positioned along a circumferential surface of the neck and engage electrical contacts within the socket. Neither Nicholson et al nor any of the other references cited in combination with Johnson et al. teach nor suggest the arrangement of claim 1. The rejection of claim 1 and those that depend therefrom under 35 U.S.C. Section 103 is therefore respectfully overcome.

New claims 5-8 directed to a cathode ray tube are presented here for examination. Claims 5 - 8 are believed to be patentably distinct from the references of record because they do not teach nor suggest terminals extending from the electron gun through the neck along an outer surface of the neck; and, a circuit board having a socket for electrically connecting components mounted thereon, the socket being electrically connected to the components and being directly mateable with the terminals extending along the outer surface of the electron gun.

In view of the amendments presented herein, Applicant believes this application to be in condition for allowance. Reconsideration and passage to issue is respectfully requested.

The fee for the one month extension of time may be charged to deposit order account number 07-0832.

Respectfully submitted,



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What is Claimed is:

1. An arrangement for coupling a cathode ray tube (CRT) to a socket which is mounted on a circuit board, said CRT having an integral funnel and a neck containing an electron gun, the neck having an end, a circumferential surface and terminals extending from said electron gun along the circumferential surface, said circuit board being positioned with a first side facing said funnel portion and a second side facing away from said funnel portion, said socket having electrical contacts which engage the terminals on said CRT, said electrical contacts being positioned on said second side of the said circuit board.
2. An arrangement as in Claim 4, in which said circuit board has a plurality of components mounted thereon, none of said components extending away from said funnel further than the back cover of said socket.
3. An arrangement of Claim 2, in which said circuit board has a plurality of components mounted on said first side.
4. An arrangement of Claim 1, in which said socket has a back cover which abuts the end of the said neck.



Version of Substitute Specification with Markings to Show Changes Made

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Field of the Invention

This invention relates to a socket for a cathode ray tube (CRT) in which the socket is part of a printed circuit board.

Background of the Invention

In modern television display apparatus, a socket for the electron gun of a CRT is constructed as part of a printed circuit board which may contain one or more video output amplifiers. This is done in order to keep the connections, between the outputs of the video amplifiers and the electrodes of the electron gun, as short as possible so as to avoid degradation of the video output signals, whose frequencies may exceed 5 megahertz.

Generally, the socket for the CRT is mounted on the circuit board, so that when the socket is engaged with the CRT, the circuit board is positioned at the rear of the CRT with the socket. The trend in modern CRT displays is to shorten the distance from the screen end of the cabinet to the rear of the cabinet. This can be accomplished in several ways. For example, a greater deflection angle will shorten the funnel portion of the CRT. At the present time, the largest deflection angle in commercial television apparatus is 110°.

Summary of the Invention

The instant invention allows further shortening of the cabinet by shortening the protrusion of the CRT socket board beyond the end of the neck [portion] of the CRT. The invention provides an arrangement for coupling a CRT to a socket which is mounted on a circuit board, in which the CRT has a funnel [portion] and a neck [portion] containing an electron gun. The terminals for the electron gun are mounted along a [side] circumferential

surface of the neck [portion] of the CRT. The circuit board is positioned with a first side which faces the funnel [portion] and a second side which faces away from the funnel [portion]. The socket has electrical contacts [terminals] which engage corresponding terminals on the neck portion of the CRT. The socket electrical contacts are positioned on the second side of the circuit board. In this way, the socket and circuit board may be positioned with only a minimum protrusion to the rear of the end of the neck [portion] of the CRT.

Brief Description of the Drawings

In the Drawing:

The sole FIGURE shows an exploded view of a socket board and the rear portion of a CRT.

Detailed Description of the Invention

The sole FIGURE shows a cathode ray tube (CRT) 18 having a funnel 20 and a neck [portion] 22 which contains an electron gun 26. The terminals 24 which connect to electron gun 26 are fed through a [the] side of the neck [portion] 22 and lie along a [the]circumferential surface 23 of neck portion 22. The invention is equally applicable to a cathode ray tube whose gun terminals exit through [the] an end 25 of neck [portion] 22 and are folded forward along the circumferential surface 23 of neck [portion] 22. Socket board 34 has electronic components 16 mounted thereon together with CRT socket 10 which contains [spring] electrical contacts 28. Electrical contacts 28 serve as terminals to connect to CRT terminals 24. Components 16 may be mounted on either side of socket bard 34, as long as no component extends away from the funnel of the CRT further than the end of socket 10. Socket 10 is mounted on the side of the circuit bard facing away from the funnel

20 of CRT 18. When socket 10 is engaged with the neck [portion] 22 mating the parts in the direction shown by arrow 32, there is substantially no protrusion of any portion of socket board 34 beyond the end 25 of neck [portion] 22. Socket 10 is provided with a back cover 12 which abuts the end 25 of neck [portion] 22, and assists in properly positioning electrical contacts 28 with respect to terminals 24. The Applicant has found that the use of the invention may reduce the depth of the cabinet by three to four centimeters.

Abstract

A socket for a cathode ray tube (CRT) forms part of a circuit board. The socket is positioned on the side of the circuit board away from the funnel [portion] of the CRT. The terminals which couple to the electron gun of the CRT are positioned along [the side] a circumferential surface of the neck of the CRT, so that when the socket is engaged with the CRT, there is substantially no portion of the socket board which protrudes beyond the end of the neck of the CRT.